CLAIMS:

1. A polarization conversion unit (17) adapted for receiving a first optical signal (16) with a first polarization state, and for generating, from said first optical signal, a set of n derived optical signals (18) with n different well-defined polarization states i, i = 1, ..., n, with n being a natural number greater than one, whereby said n different well-defined polarization states are selected such that polarization dependent measurement errors of the n derived optical signals substantially cancel irrespective of the first optical signal's polarization state.

2. The polarization conversion unit according to claim 1, wherein the number n of derived optical signals is smaller than ten and preferably four.

3. The polarization conversion unit according to claim 1 or any one of the above claims, wherein said n derived optical signals (18) are generated from said first optical signal (16) by a predetermined sequence of conversion steps.

4. The polarization conversion unit according to claim 1 or any one of the above claims, wherein the states of polarization are selected in a way that the sum of all the cosines of δ_i over all n different well-defined polarization states i, i = 1, ..., n, with δ_i denoting the angle between the respective polarization state i and the polarization state of maximum transmission of the optical measurement system's receiver circuitry in a Poincaré sphere representation, is substantially equal to zero.

5. The polarization conversion unit according to claim 1 or any one of the above claims, wherein, from said first polarization state, two derived optical signals with two different polarization states (S, S*) are generated, whereby the second one (S*) of said two polarization states is the inverse of the first one (S) of said two polarization states.

6. The polarization conversion unit according to claim 1 or any one of the above claims, wherein, from said first polarization state, which can be represented by a Stokes vector (1, a, b, c) in a Poincaré sphere representation, four derived optical signals with four different polarization states are generated, whereby said four

polarization states can be represented by Stokes vectors (1, a, -c, b), (1, -a, -c, -b), (1, -a, c, b), (1, a, c, -b) in a Poincaré sphere representation, with the first component of said Stokes vectors being normalized to one irrespective of the optical signal's power.

7. The polarization conversion unit according to claim 1 or any one of the above claims, comprising a planar rotator (25), preferably a Faraday rotator, preferably based on an optically active material, and a rotatable quarter wave plate (26) for generating said n derived optical signals.

8. The polarization conversion unit according to claim 7, wherein

- said planar rotator is set to a rotation angle of 0° and said quarter wave plate is rotated by 0° in order to generate a first derived optical signal corresponding to a Stokes vector (1, a, -c, b),
- said planar rotator is set to a rotation angle of 90° and said quarter wave plate is rotated by 0° in order to generate a second derived optical signal corresponding to a Stokes vector (1, -a, -c, -b);
- said planar rotator is set to a rotation angle of 90° and said quarter wave plate is rotated by 90° in order to generate a third derived optical signal corresponding to a Stokes vector (1, -a, c, b),
- said planar rotator is set to a rotation angle of 0° and said quarter wave plate is rotated by 90° in order to generate a fourth derived optical signal corresponding to a Stokes vector (1, a, c, -b) in a Poincaré sphere representation,
- whereby said four derived optical signals are generated in arbitrary order.

9. The polarization conversion unit according to claim 1 or any one of the above claims, comprising a rotatable half wave plate (31) and a rotatable quarter wave plate (32) for generating said n derived optical signals.

10. The polarization conversion unit according to claim 9, wherein

- said half wave plate is rotated by 0° and said quarter wave plate is rotated by 0° in order to generate a first derived optical signal corresponding to a Stokes vector (1, a, c, -b),
- said half wave plate is rotated by 45° and said quarter wave plate is rotated by 0° in order to generate a second derived optical signal corresponding to a Stokes vector (1, -a, c, b);
- said half wave plate is rotated by 45° and said quarter wave plate is rotated by 90° in order to generate a third derived optical signal corresponding to a Stokes vector (1, -a, -c, -b),
- said half wave plate is rotated by 0° and said quarter wave plate is rotated by 90° in order to generate a fourth derived optical signal corresponding to a Stokes vector (1, a, -c, b) in a Poincaré sphere representation,
- whereby said four derived optical signals are generated in arbitrary order.

11. An optical measurement system for determining a signal strength of a first optical signal (16) with a first polarization state, comprising
    - a polarization conversion unit (17) according to any of claims 1 to 10;
    - a determination unit (20) adapted for measuring the signal strengths of the n derived optical signals (18) generated by said polarization conversion unit;
    - an averaging unit (21) which determines an average value of the signal strengths for the n derived optical signals.

12. The apparatus according to claim 11, wherein said determination unit is an optical power meter which determines the signal strengths of the n derived optical signals.

13. A measurement set-up for determining an insertion loss of a device under test – DUT – comprising:
    - a light source, in particular a tunable light source, adapted for generating light that is incident on said DUT;

- said DUT which generates, in response to said incident light, a response signal; and

- a polarization conversion unit according to any of claims 1 to 10, which derives, from at least one of: said incident light or said response signal, a set of n derived optical signals with n different well-defined polarization states,

- a determination unit adapted for measuring the signal strengths of the n derived optical signals generated by said polarization conversion unit;

- an averaging unit which averages the measurement results obtained for the n derived well-defined polarization states.

14. The measurement set-up according to claim 13, further comprising a polarization controller for converting the light of said light source to a number of polarization states at the input of the DUT.

15. A measurement set-up for determining a polarization dependent loss of a device under test – DUT – comprising:

- a light source (11), in particular a tunable light source;

- a polarization controller (13) adapted for varying the polarization state of the light (12) emitted by said light source, in order to generate polarized light (14) that is incident on said DUT (15);

- said DUT (15) which generates, in response to said polarized light (14), a response signal (16); and

- a polarization conversion unit (17) according to any of claims 1 to 10, which derives, from at least one of: said incident light (14) or said response signal (16), a set of n derived optical signals (18) with n different well-defined polarization states,

- a determination unit (20) adapted for measuring the signal strengths of the n derived optical signals (18) generated by said polarization conversion unit

(17);

- an averaging unit (21) which averages the measurement results obtained for the n derived well-defined polarization states.

16. A method for reducing or eliminating polarization dependent measurement errors, said method comprising a step of:

- converting a first optical signal (16) with a first polarization state into a set of n derived optical signals (18) with n different well-defined polarization states, whereby said n different well-defined polarization states are selected such that polarization dependent measurement errors of the n derived optical signals cancel irrespective of the first optical signal's polarization state.

17. The method according to claim 16, wherein the number n of derived optical signals is smaller than ten.

18. The method of claim 16 or any one of the above claims, wherein said n derived optical signals are generated from said first optical signal by a predetermined sequence of conversion steps.

19. The method according to claim 16 or any one of the above claims, wherein the states of polarization are chosen in a way that the sum of all the cosines of δ_i over all n different well-defined polarization states i, i = 1, ..., n, with δ_i denoting the angle between the respective polarization state i and the polarization state of maximum transmission of the optical measurement system's receiver circuitry in a Poincaré sphere representation, is substantially equal to zero.

20. The method according to claim 16 or any one of the above claims, comprising a step of

- generating, from said first polarization state, two derived optical signals with two different polarization states, whereby the second one of said two polarization states is the inverse of the first one of said two polarization states.

21. The method according to claim 16 or any one of the above claims, comprising a step of

- generating, from said first polarization state, which can be represented by a Stokes vector (1, a, b, c) in a Poincaré sphere representation, four derived optical signals with four different polarization states, whereby said four polarization states can be represented by Stokes vectors (1, a, -c, b), (1, -a, -c, -b), (1, -a, c, b), (1, a, c, -b) in a Poincaré sphere representation, with the first component of said Stokes vectors being set to one irrespective of the optical signal's power.

22. The method according to claim 21, wherein said four derived polarization states are generated by means of a planar rotator, preferably a Faraday rotator, preferably based on an optically active material, and a rotatable quarter wave plate.

23. The method according to claim 21, wherein said four derived polarization states are generated by means of a rotatable half wave plate and a rotatable quarter wave plate.

24. The method according to claim 16 or any one of the above claims, further comprising the following steps:

   - determining, for each of said n derived optical signals, the signal strength of the respective derived optical signal;

   - averaging the measurement results obtained for the n derived well-defined polarization states.

25. A software program or product, preferably stored on a data carrier, for partly or completely executing the method of claim 16 or any one of the above claims when run on a data processing system such as a computer.

26. The polarization conversion unit or the method according to any one of the above claims, wherein the states of polarization are selected in a way that an average in power of the n derived optical signals (18) is substantially independent of the first polarization state.